Amendments to the Claims

The following listing of claims replaces all prior versions and listings of the claims.

Listing of Claims

1. (currently amended) A method comprising obtaining a feed forward input signal to compensate a cage frequency of a motor from a sensor adjacent a disc rotated by said motor, and applying the feed forward input signal to a servo writer to write substantially circular tracks of servo data to said disc. ~~of compensating for disturbances that cause track shape irregularities on a disc during a disc servo writing process, the disturbances substantially attributable to a nonrepeatable runout (NRRO) substantially caused by a cage frequency generated in a motor supporting the disc, the method comprising steps of.~~

~~(a) determining a reference cage frequency;~~

~~(b) determining a feed forward input signal based on the reference cage frequency; and~~

~~(c) feed forwardly applying the feed forward input signal to the servo writer to substantially eliminate the track shape irregularities as track servo patterns are written by a servo writing head operably connected to the servo writer.~~

2. (currently amended) The method of claim 1 ~~wherein the reference cage frequency determining step (a) comprises steps of:~~ wherein the sensor comprises a reference head adjacent a plurality of servo data sectors on a reference track on the disc and the obtaining step further comprises using the reference head to transduce position error signal (PES) values from said sectors.

~~(a)(i) writing a reference track that has minimal track shape irregularities;~~

~~(a)(ii) measuring a series of Position Error Signal values (PESs) using a reference position sensor, each PES value in the series corresponding to a sector on the reference track;~~

~~(a)(iii) determining a multiple series of PESs by repeating the step (a)(ii) over multiple disc revolutions, each series of PESs measured over one disc revolution;~~

~~(a)(iv) determining a series of repeatable runout values (RROs) for all sectors on the reference track, each RRO sequentially corresponding to a sector on the reference track, each RRO of a sector being an average of all PESs of the sector; and~~

~~(a)(v) determining the reference cage frequency of the reference track by subtracting the RRO of each sector from the PES of the same sector on the reference track.~~

3. (currently amended) The method of claim 2 wherein the reference track and the reference head are disposed adjacent an outside diameter (OD) of the disc. ~~wherein the reference cage frequency determining step (a) further comprises step of:~~

~~(a)(vi) phase adjusting the reference cage frequency of the reference track based on an angular displacement of the reference position sensor relative to the servo-writing head.~~

4. (currently amended) The method of claim 1 wherein the obtaining step further comprises using a data transducing head controllably positionable by the servo writer to transduce position error signal (PES) samples from servo data written to the disc and determining the feed forward input signal in relation to the sensor and said PES

samples. ~~3 wherein the feed-forward input signal determining step (b) comprises steps of:~~

~~(b)(i) determining a calibration factor; and~~

~~(b)(ii) determining the feed-forward input signal based on the calibration factor and the phase-adjusted reference cage frequency determined during the servo-writing process.~~

5. (currently amended) The method of claim 4 wherein the PES samples of the obtaining step are transduced from servo data written to a first track adjacent an outside diameter (OD) of the disc and from servo data written to a second track adjacent an inside diameter (ID) of the disc, and wherein the determined feed forward input signal is further provided as a function of disc radius in response to the PES samples transduced from the respective OD and ID of the disc. ~~wherein the calibration factor determining step (b)(i) comprises steps of:~~

~~(b)(i)(1) writing an OD calibration track and an ID calibration track, the OD calibration track being located near an outer edge of the disc and the ID calibration track being located near an inner edge of the disc, both calibration tracks having minimal track shape irregularities;~~

~~(b)(i)(2) determining an OD cage frequency peak magnitude on the OD calibration track;~~

~~(b)(i)(3) determining an ID cage frequency peak magnitude on the ID calibration track; and~~

~~(b)(i)(4) determining the calibration factors for each sector on subsequent tracks to be written by the servo-writer based on the circumferential position of the corresponding sector, the radial position of the corresponding sector~~

~~with respect to the OD and ID calibration tracks, and the OD and ID peak magnitudes corresponding to the radial position of the corresponding sector.~~

Claims 6-8 (cancelled).

9. (currently amended) A computer readable media readable by a computer and encoding instructions for executing the method recited in claim ~~8~~ 1.

10 (currently amended) ~~A disturbance removal system for compensating for disturbances that cause track shape irregularities on a disc during a disc servo-writing process performed by a servo-writer moving a servo-writing head, the disturbances substantially attributable to a nonrepeatable runout (NRRO) substantially caused by a cage frequency generated in a motor supporting the disc, the disturbance removal system~~ An apparatus comprising:

a reference position sensor adjacent a disc rotatable by a motor;

a reference cage frequency determination module ~~electrically connected to the reference position sensor~~ which determines a reference cage frequency of the motor from the reference position sensor;

a feed-forward input signal determination module ~~connected to the reference cage frequency determination module, determining~~ which determines a feed-forward input signal based on the reference cage frequency; and

a servo-writing module which adjusts a position of a data transducer to write substantially circular tracks of servo data on the disc in response to the feed-forward input signal ~~receiving the feed-forward input signal from~~

~~the feed-forward input signal determination module, while the servo-writing head electrically connected to the servo-writing module is writing servo patterns on the disc during the servo-writing process.~~

11. (currently amended) The ~~disturbance removal system~~ apparatus of claim 10 wherein the reference cage frequency determination module comprises:

a reference track writing module causing the servo-writing module to write a reference track that has minimal track shape irregularities on the disc;

a Position Error Signal (PES) measurement module that measures a series of reference PESs detected by the reference position sensor, each reference PES of the series sequentially corresponding to each sector on the reference track;

a repeatable runout (RRO) determination module that determines a series of RROs for all sectors on the reference track, each RRO sequentially corresponding to a sector on the reference track, each RRO of a sector being an average of all PESs of the sector; and

a reference cage frequency determination module that determines the reference cage frequency by subtracting the determined RRO of each sector on the reference track from the PES of the same sector measured during the servo-writing process; and

12. (currently amended) The ~~disturbance removal system~~ apparatus of claim 11 wherein the reference cage frequency determination module further comprises a phase adjusting module that adjusts a phase of the reference cage frequency based on an angular displacement of the reference position sensor relative to the servo-writing head.

13. (currently amended) The ~~disturbance removal system~~ apparatus of claim 12 wherein the feed-forward input signal determination module comprises a calibration factor determination module that determines a calibration factor, wherein the feed-forward input signal determination module determines the feed-forward input signal based at least on the calibration factor and the phase adjusted reference cage frequency.

14. (currently amended) The ~~disturbance removal system~~ apparatus of claim 13 wherein the calibration factor determination module comprises:

a calibration track writing module that writes an OD calibration track and an ID calibration track, the OD calibration track being located near an outer edge of the disc and the ID calibration track being located near an inner edge of the disc, both calibration tracks having minimal track shape irregularities;

an OD peak magnitude determination module that determines an OD cage frequency peak magnitude; and

an ID peak magnitude determination module that determines an ID cage frequency peak magnitude, wherein

the calibration factor determination module determines the calibration factors for each sector on subsequent tracks to be written by the servo-writer based on the circumferential position of the corresponding sector with respect to the OD and ID calibration tracks, and the OD and ID peak magnitudes corresponding to the radial position of the corresponding sector.

Claims 15-28 (cancelled).